What Is Claimed Is:

1. An apparatus comprising:

a first optical waveguide producing a first optical output;

a first electrode substantially parallel to the first waveguide;

a second optical waveguide producing a second optical output;

a second electrode substantially parallel to the second waveguide; and

a photo detector in the path of an interference pattern produced by the first and second optical outputs.

2. The apparatus of claim 1, wherein the photo detector detects the location of a null of the interference pattern.

3. The apparatus of claim 1, wherein the photo detector includes an array of photo detector elements.

4. The apparatus of claim 3, further comprising:

a decoder coupled to the photo detector array.

5. The apparatus of claim 4, further comprising:

an optical divider coupled between the inputs of the first and second optical waveguides.

6. The apparatus of claim 5, further comprising:

an optical source coupled to the input of the optical divider.

7. The apparatus of claim 4, further comprising:

a lens assembly optically coupled between the outputs of the first and second optical waveguides and the photo detector array.

8. The apparatus of claim 7, wherein the outputs of the waveguides are angled towards each other to produce a focal point.

9. The apparatus of claim 8, wherein the lens assembly comprises:

a magnifying lens optically coupled to the waveguide output ports;

a one-dimensional focusing lens coupled to the magnifying lens; and

a micro-lens coupled between the focusing lens and the photo detector array.

10. The apparatus of claim 9, wherein the lens assembly comprises a prism.

11. The apparatus of claim 7, wherein the lens assembly comprises an optical Rotman lens.

12. The apparatus of claim 11, wherein the optical Rotman lens has first and second inputs and multiple outputs, wherein the first and second inputs receive the outputs of the first and second optical waveguides, respectively, and wherein each element of the photo detector array receives one of the multiple outputs of the Rotman lens.

13. A method comprising:

electro-optically modulating a first optical signal using a first electrical signal;

electro-optically modulating a second optical signal using a second electrical signal; and

combining the first and second modulated optical signals in a diffraction region, producing an interference pattern.

14. The method of claim 13, further including:

detecting a null of the interference pattern.

15. The method of claim 13, wherein the diffraction region is a Rotman lens.

16. The method of claim 13, wherein the diffraction region is free space.

17. The method of claim 13, further comprising:

producing an output electrical signal based on the location of a null of the interference pattern.

18. The method of claim 17, wherein the interference pattern is detected by a photo detector array having multiple elements wherein each element of the photo detector array receives one of the multiple outputs of a Rotman lens.

19. The method of claim 18, further comprising:

generating the first and second optical signals using a laser and an optical divider.

20. A method of measuring an input signal, comprising:

producing an interference pattern based on the input signal;

detecting a location of a null of the interference pattern; and

producing an output signal based on the location of the null.

21. The method of claim 20, further including:

receiving a first electrical input signal;

electro-optically modulating a first optical signal using the first electrical signal;

combining the modulated first optical signal with a second optical signal

to produce the interference pattern.

22. The method of claim 21, further including:

receiving a second electrical input signal;

electro-optically modulating the second optical signal using the second electrical signal; and

combining the modulated first and second optical signals to produce the interference pattern.

23. The method of claim 20, wherein the output signal is measured to determine an input voltage.

24. The method of claim 20, wherein the output signal is measured to determine the phase difference between two input optical signals.